



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

| APPLICATION NO.  | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO.   | CONFIRMATION NO. |
|--|-------------|----------------------|-----------------------|------------------|
| 10/536,781   | 10/11/2005  | Nigel Paul Schofield | M02B162               | 4221             |
| 71134  | 7590        | 03/18/2010           | EXAMINER              |                  |
| Edwards Vacuum, Inc.<br>2041 MISSION COLLEGE BOULEVARD<br>SUITE 260<br>SANTA CLARA, CA 95054 |             |                      | STIMPERT, PHILIP EARL |                  |
|  |             |                      | ART UNIT              | PAPER NUMBER     |
|  |             |                      | 3746                  |                  |
|  |             |                      | NOTIFICATION DATE     | DELIVERY MODE    |
|  |             |                      | 03/18/2010            | ELECTRONIC       |

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

LORETTA.SANDOVAL@EDWARDSVACUUM.COM

|                              |                        |                       |  |
|------------------------------|------------------------|-----------------------|--|
| <b>Office Action Summary</b> | <b>Application No.</b> | <b>Applicant(s)</b>   |  |
|                              | 10/536,781             | SCHOFIELD, NIGEL PAUL |  |
|                              | <b>Examiner</b>        | <b>Art Unit</b>       |  |
|                              | Philip Stimpert        | 3746                  |  |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

1) Responsive to communication(s) filed on 14 January 2010.  
 2a) This action is **FINAL**.                    2b) This action is non-final.  
 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

4) Claim(s) 1,3-5,7-11,16,18 and 19 is/are pending in the application.  
 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.  
 5) Claim(s) \_\_\_\_\_ is/are allowed.  
 6) Claim(s) 1,3-5,7-11,16,18 and 19 is/are rejected.  
 7) Claim(s) \_\_\_\_\_ is/are objected to.  
 8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

9) The specification is objected to by the Examiner.  
 10) The drawing(s) filed on 13 May 2009 is/are: a) accepted or b) objected to by the Examiner.  
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
 a) All    b) Some \* c) None of:  
 1. Certified copies of the priority documents have been received.  
 2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

|  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                     | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ .                                    |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____.   | 6) <input type="checkbox"/> Other: _____ .                        |

## DETAILED ACTION

### ***Claim Rejections - 35 USC § 102/103***

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

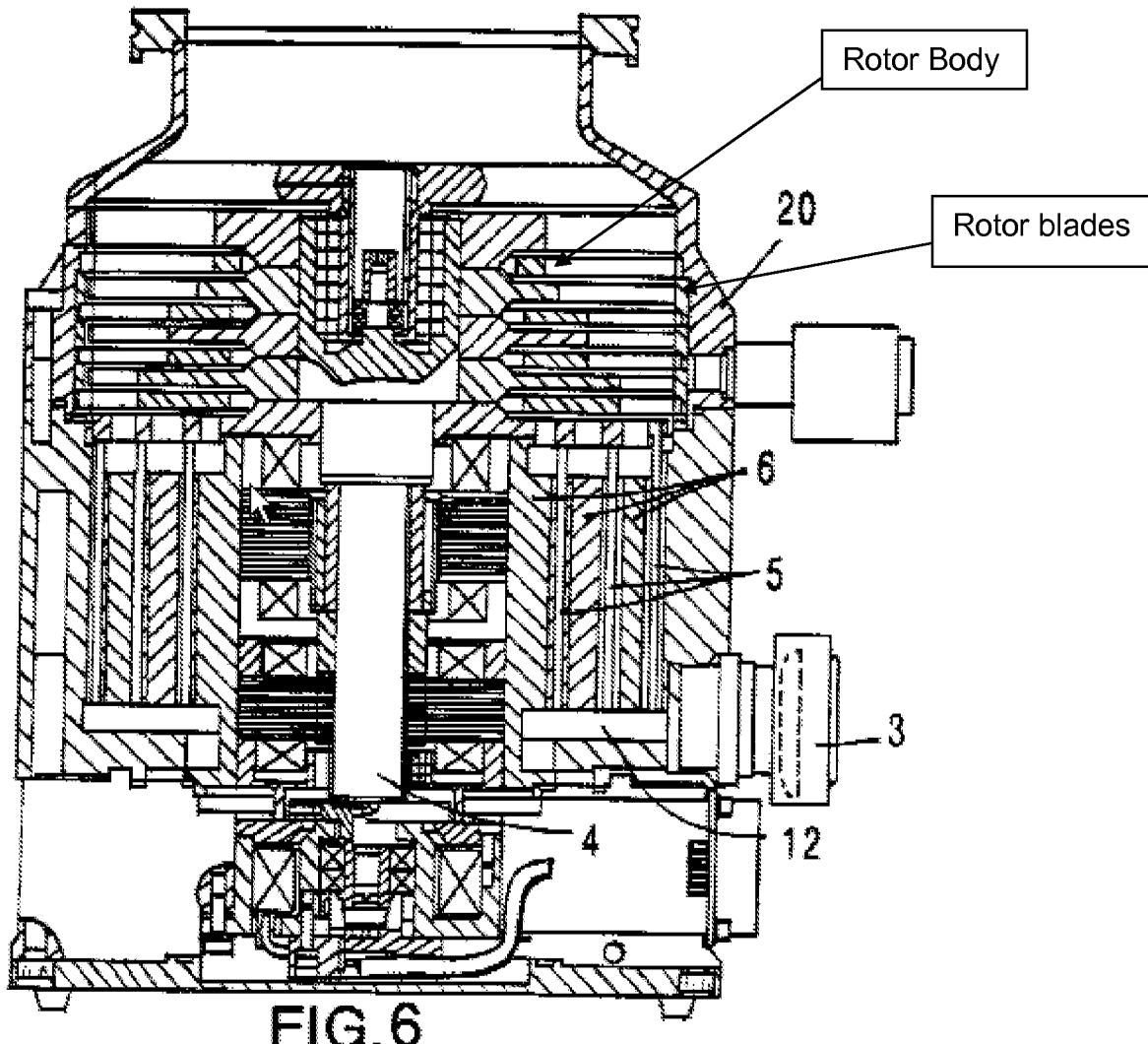
(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1, 3-5, 7, 8, and 16 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over US Patent 5,893,702 to Conrad et al. (Conrad hereafter).

4. Regarding claim 1, Conrad teaches a vacuum pumping arrangement comprising a turbomolecular pumping mechanism (20) having a rotor (not labeled, clearly shown in Fig. 6) comprising a rotor body and rotor blades extending radially outward from the rotor body as shown below:



5. Conrad also teaches a molecular drag pumping mechanism (5) and various connection elements (10, see particularly the embodiment of Fig. 3) for connecting the drag pumping mechanism's cylindrical elements together and to the rotor. As shown in Fig. 3, the connection element may comprise rotor vanes such as those of the turbomolecular pumping stage (20). As such, the rotor blades are provided with an annular ring (within the axial extent of the blades, or at least at their intersection with the drag pump rotors 5) to which is affixed the rotors (5) of the drag pumping mechanism.

The ring, and the molecular drag pumping mechanism are provided coaxially with the rotor body and within the radial extent of the rotor blades. The examiner believes that this disclosure anticipates the claimed invention, since the connection element (10) is discussed in several embodiments, and no particular embodiment is described as being utilized in the combined turbomolecular and drag pumping system of Fig. 6. However, Conrad further teaches that the drag pumping mechanism advantages "become particularly noticeable when it is used in combination with a turbomolecular pump," (col. 3, ln. 20-21). As such, it would have been obvious to one of ordinary skill in the art to combine a drag pumping mechanism as in Fig. 3 of Conrad with a turbomolecular pumping mechanism as shown in Fig. 6 in order to more fully realize the benefits of Conrad's invention.

6. Regarding claim 3, as shown in Fig. 6, the turbomolecular pumping mechanism has multiple stages. In utilizing the connection element (10) of Fig. 3, the element would constitute the last stage of the turbomolecular pumping mechanism.

7. Regarding claim 4, as shown in Fig. 6, the drag pumping sections are supported approximately halfway along the radial extent of the turbomolecular blade sections. The examiner notes that there are several drag pump rotors (5) shown in Fig. 6, and that "approximately" significantly widens the locations which satisfy the language of the claim.

8. Regarding claim 5, as shown in Fig. 6, the drag pumping section has a plurality of rotors (5) affixed to the rotor blades (10).

9. Regarding claim 7, as shown in Figs. 1 and 6, each rotor (5) of the drag pumping mechanism has a pumping path radially inward thereof and a parallel path radially outward.

10. Regarding claims 8 and 16, as shown in Figs. 1 and 6, the drag pumping mechanism is of a Holweck type.

11. Claims 9, 18, and 19 rejected under 35 U.S.C. 103(a) as being unpatentable over Conrad as applied to their respective parent claims above, and further in view of US Patent 6,135,709 to Stones (Stones).

12. Regarding claims 9, 18, and 19, Conrad does not teach a second molecular drag pumping mechanism supported on the rotor of a regenerative pumping mechanism. Stones teaches a vacuum pump, particularly teaching a turbomolecular pump followed in series by a Holweck type drag pump (2) mounted on the rotor of a regenerative pump (1). Stones teaches that hybrid or compound vacuum pumps combining different pump types can improve overall operating range and throughput of a particular pumping installation (col. 1, ln. 4-8). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to provide the pump of Conrad with further stages such as a molecular drag pump mounted on a regenerative pump rotor as taught by Stones in order to improve overall operating range and throughput.

13. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Conrad as applied to claim 1 above, and further in view of US Patent 4,465,434 to Rourk (Rourk).

14. Conrad substantially teaches the invention of claim 1 from which claim 10 depends, as discussed in the above rejection of claim 1. However, Conrad does not teach the use of specific materials in his vacuum pump. However, it is known that turbomolecular and molecular drag pumps generate heat. Rourk teaches a carbon fiber composite turbine wheel, and that the use of carbon fiber composites increases the temperature at which a rotor may operate. Rourk further teaches that in his particular structure, "interlaminar shear stress associated with load transfer from radial to circumferential is minimized," (col. 2, ln. 3-5). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to form the rotor of the molecular drag pump of Conrad from a carbon fiber composite as taught by Rourk in order to increase heat resistance and minimize interlaminar shear stress.

15. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Conrad as applied to claim 1 above, and further in view of US Patent 5,230,924 to Schofield (Schofield).

16. Conrad substantially teaches the invention of claims 1 and 2 from which claim 11 depends, as discussed in the above rejection of claim 1. Conrad does not teach the use of specific materials in his vacuum pump. Schofield teaches that aluminum is generally useful for compound vacuum pumps (col. 3, ln. 26-29). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to use aluminum to form elements of the vacuum pump of Conrad.

***Response to Arguments***

17. Applicant's arguments filed 14 January 2010 have been fully considered but they are not persuasive.

18. To clarify the rejection, the anticipatory teaching envisioned by the examiner relies on the connection element shown in Fig. 3 of Conrad. This connection element is constituted by vanes (14), or in other words, rotor blades. The examiner is unaware of any distinction on the level of broadest reasonable interpretation between such a set of vanes and a final stage of a turbomolecular pump. Thus, any combination within the teachings of Conrad is not considered to eliminate the connection element the compound pump of Fig. 6, but rather to substitute the mounting structure, i.e. rotor blades, shown in Fig. 3 for the disc-like connection element shown. Further, though it is not explicitly shown in Fig. 3, the description of the vanes (14) as a connection element, in the context of the disclosure, requires an interface between the drag pump rotors (5) and the vanes (14). Given the relative radial orientations of the turbomolecular rotor blades, such an interface must be located within the radial extent of the blades. As envisioned by the rejection, it is this interface, i.e. the end of each drag pump rotor proximate and attached to the vanes which constitutes the annular ring of the claim language. The functional portion of the rotors is attached to this annular ring by integral formation.

19. In light of the foregoing, the examiner submits that Conrad substantially teaches the claimed invention.

20. As an additional matter, the examiner notes that the interpretation set forth above is intended to most closely match the concept of the invention as understood by the examiner. However, several limitations in the claim language are amenable to a broader interpretation. In particular, "a rotor... is affixed to the rotor blades" reads on the unmodified Fig. 6 of Conrad, since the turbomolecular and molecular drag pumping mechanisms are "mounted on a common shaft" (col. 4, ln. 40-41) and are thus unitary and mutually affixed. Further, "the rotor blades... are provided with an annular ring" and the following limitations does not specify the point at which annular ring is mounted, and thus also reads on the unmodified Fig. 6 of Conrad.

***Conclusion***

21. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Philip Stimpert whose telephone number is (571)270-1890. The examiner can normally be reached on Mon-Fri 7:30AM-4:00PM, EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Devon Kramer can be reached on (571) 272-7118. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Devon C Kramer/  
Supervisory Patent Examiner, Art  
Unit 3746

/P. S./  
Examiner, Art Unit 3746  
12 March 2010